

Water Management and Its Impacts to Florida Bay: Refocusing on downstream effects

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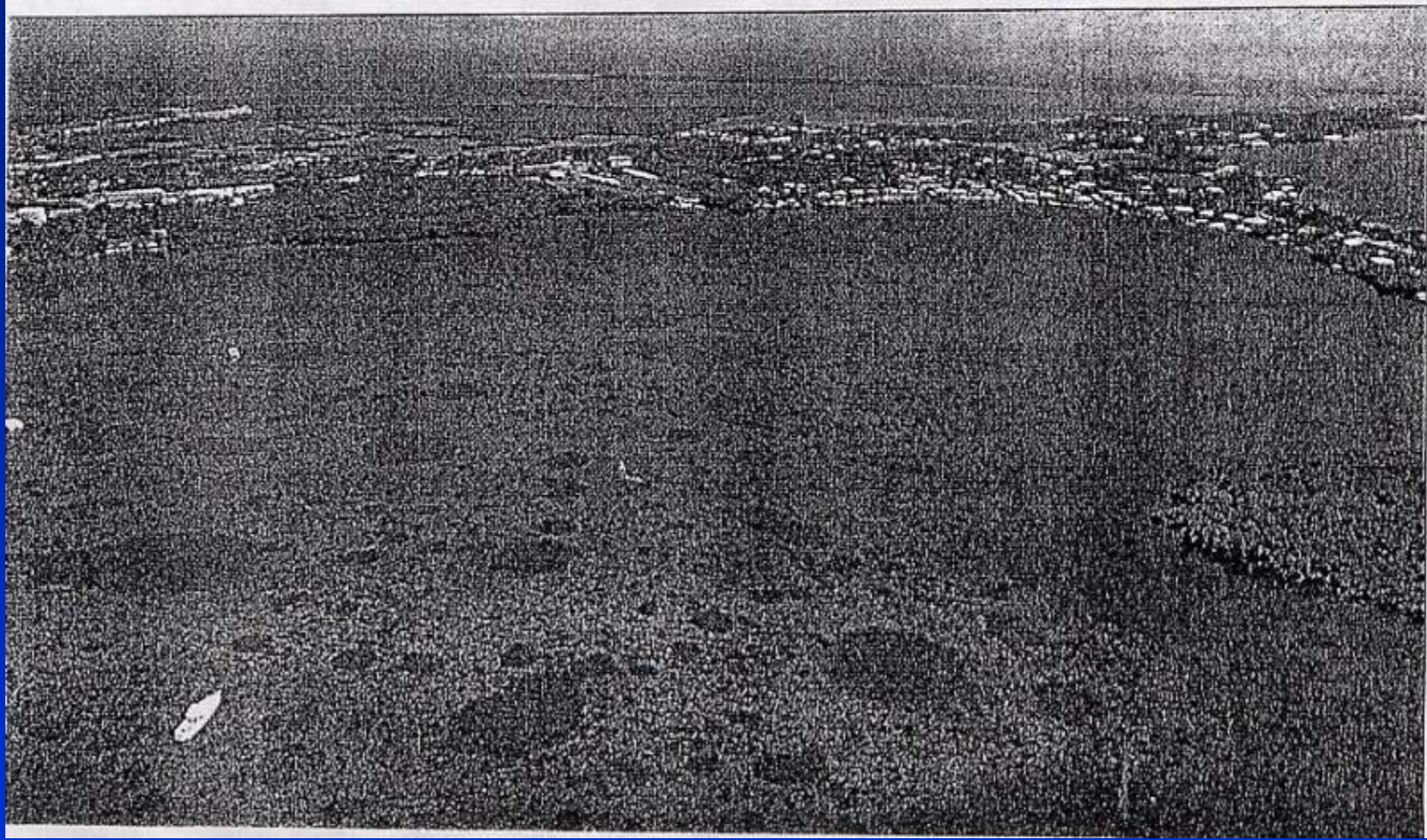
The Miami Herald

TUESDAY, AUGUST 11, 1992

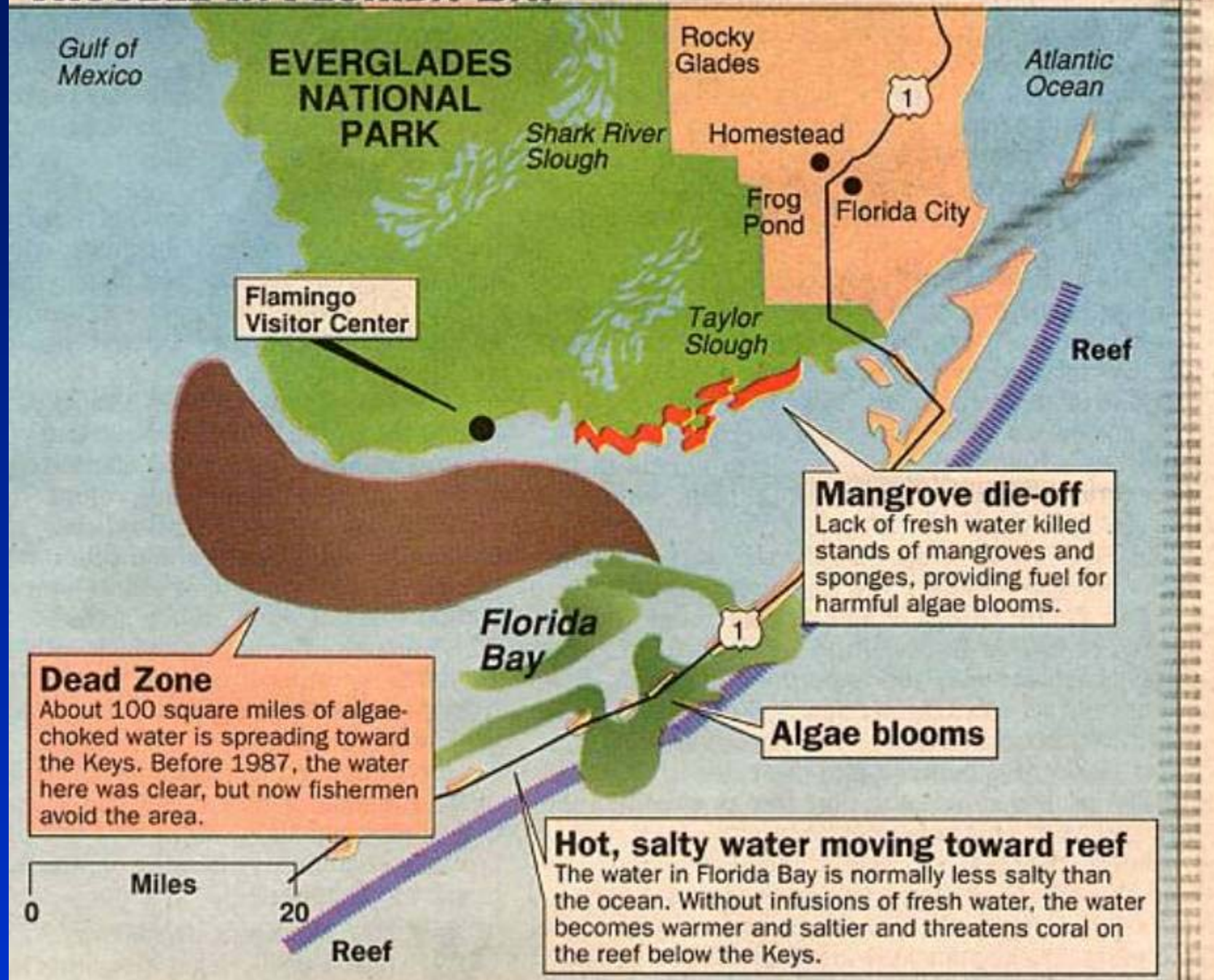
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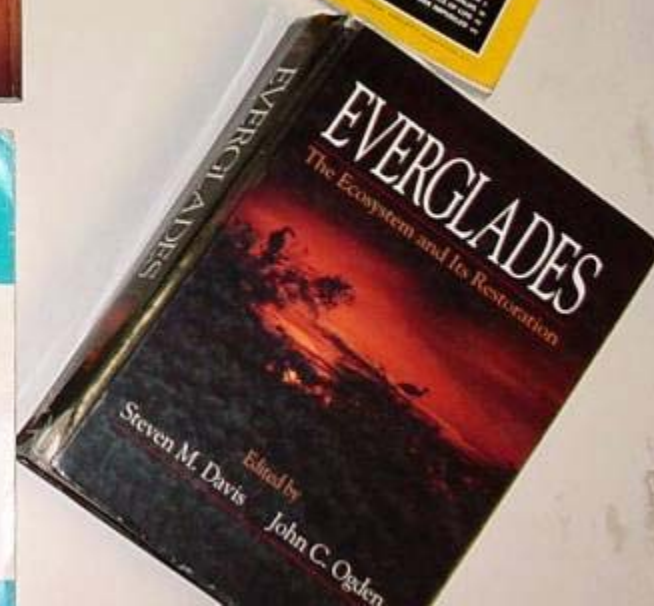
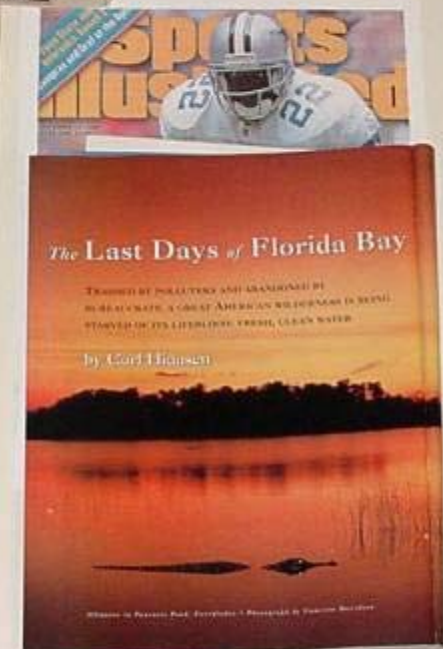
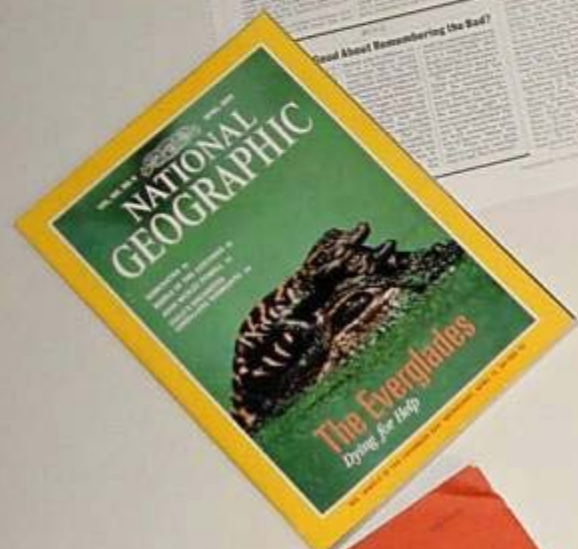
'Florida Bay is falling apart like a rotting piece of cloth.'

— JAY ZIEMAN, marine scientist



TROUBLE IN FLORIDA BAY





Recent Years: Perception that Fl. Bay is Healing

- Quotes from the IOP-FEIS May 2002
 - “Under Alt7R, the effect of pumping into seepage reservoirs from S-332D could slightly decrease stages in Taylor Slough.”
 - “The effects...are expected to reduce flows to Florida Bay during wet season months”
- Does not seem to attract too much attention

“Umbrella” Type Indicator Species











UNIQUE TREASURES OF THE LOWER KEYS

Pristine and undisturbed, the Lower Keys possesses its own unique identity. With the Florida Keys National Marine Sanctuary and Bahia Honda State Park, rated the nation's second most beautiful beach, the Lower Keys are taking active steps to preserve the natural beauty, as well as the history of the area. The Blue Hole, a rock quarry from railroad days, is now home to many fascinating wildlife species, some of which can be found only on these coral islands. The best known is the diminutive Key Deer. The dive wreck, Adolphus Busch Sr., along with many natural reefs in the area, offers some of the best diving in the Keys. See our feature on page 66 to learn more about places to see in the Lower Keys.



DIVING & SNORKELING

Beneath the calm blue veneer of the Gulf waters just miles off the Keys' sparkling shores lies one of the most stunning coral reefs in the world. One of the most complex and beautiful ecosystems on earth, the coral reef provides habitat for diverse forms of exotic marine life and gives divers and snorkelers a glimpse of submerged gardens of unimaginable beauty. See page 19.

Welcome to the FLORIDA KEYS



KEYS



Your "key" to traveling the Keys, these green and white mile markers (MM) begin with MM 126 one mile past Florida City and end with MM 0 in Key West. Nearly everyone uses them to give directions.

Gateway to the Keys

9

Perched between the subtropical splendor of the Everglades and cosmopolitan Miami, this area encompasses both extremes.

Key Largo

15

Most famous for its stunning offshore reef, this area is also known for watersports and a kick-back-and-relax attitude.

Islamorada

31

Known as the "sport fishing capital of the world," Islamorada is also home to a number of beautiful state parks.

Marathon

49

This sleepy fishing village has evolved into a bustling town that is truly the "heart of the keys" with an abundance of fun family attractions.

The Lower Keys

65

The largest and least developed area in the island chain offers abundant wildlife and natural wonders.

Key West

69

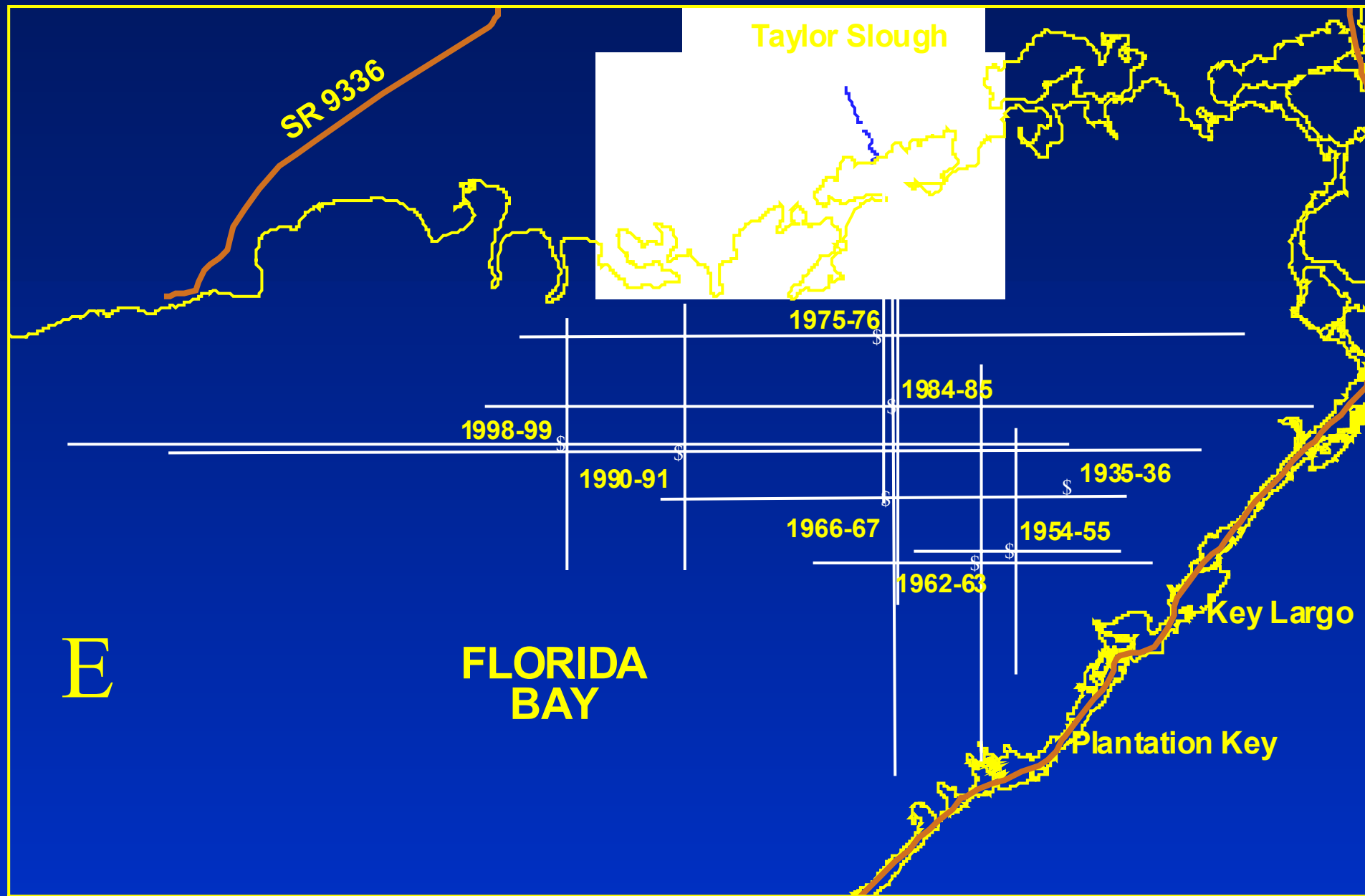
Only 90 miles from Cuba and 150 from Miami, history, eccentricity and island charm mix to create the perfect tropical getaway.



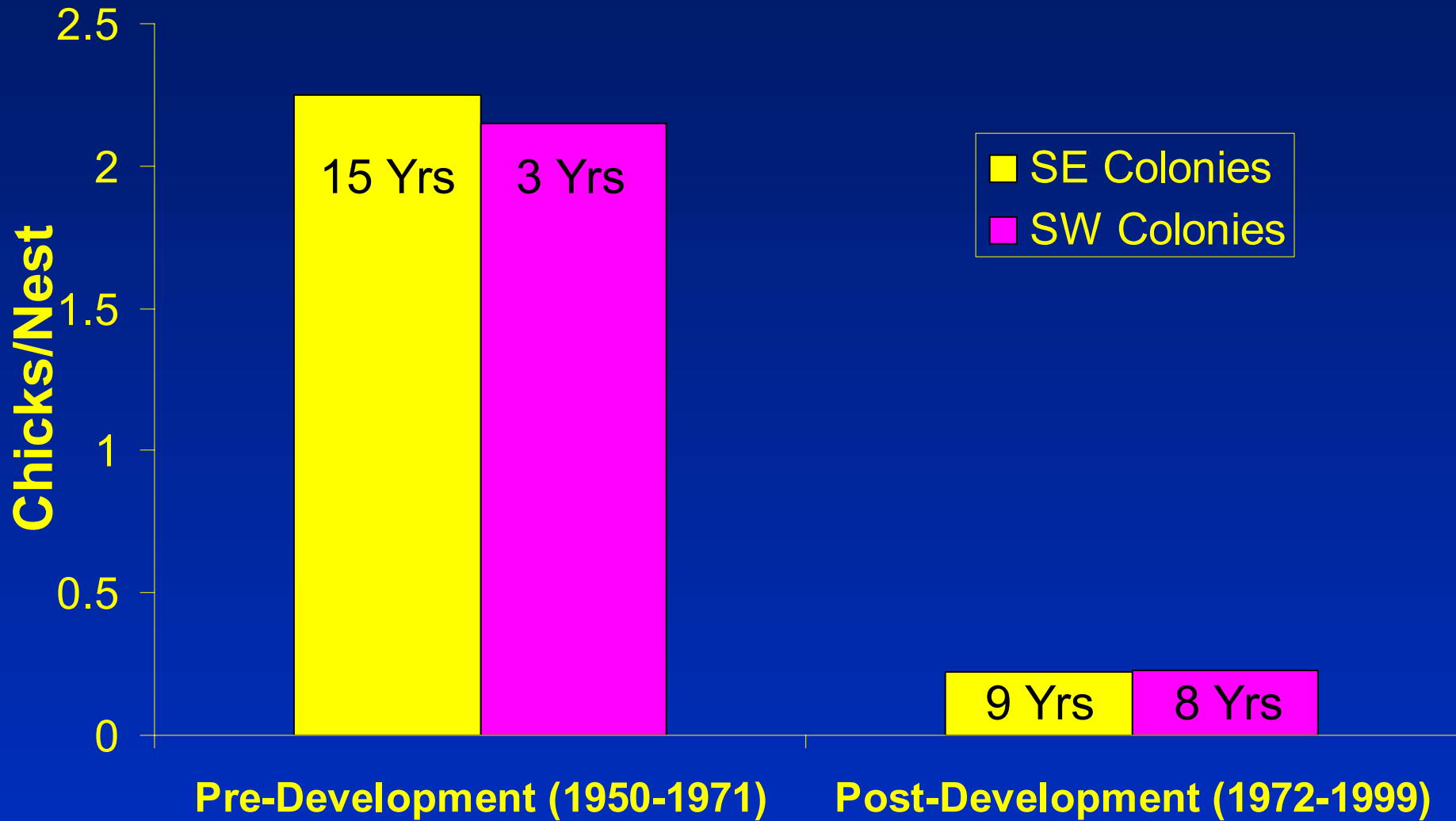
“Keystone” Type Ecological Indicator





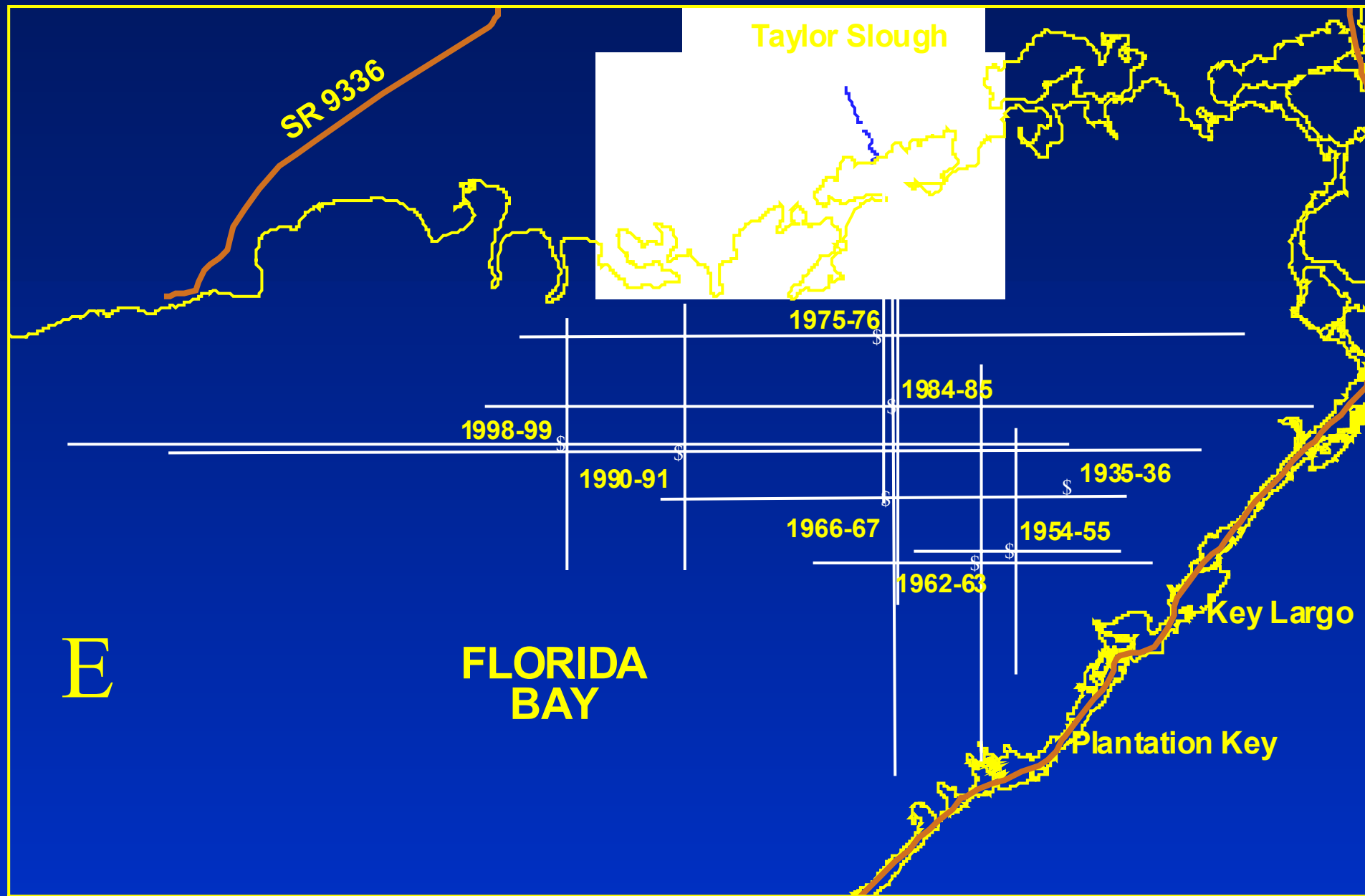


Average Nest Production

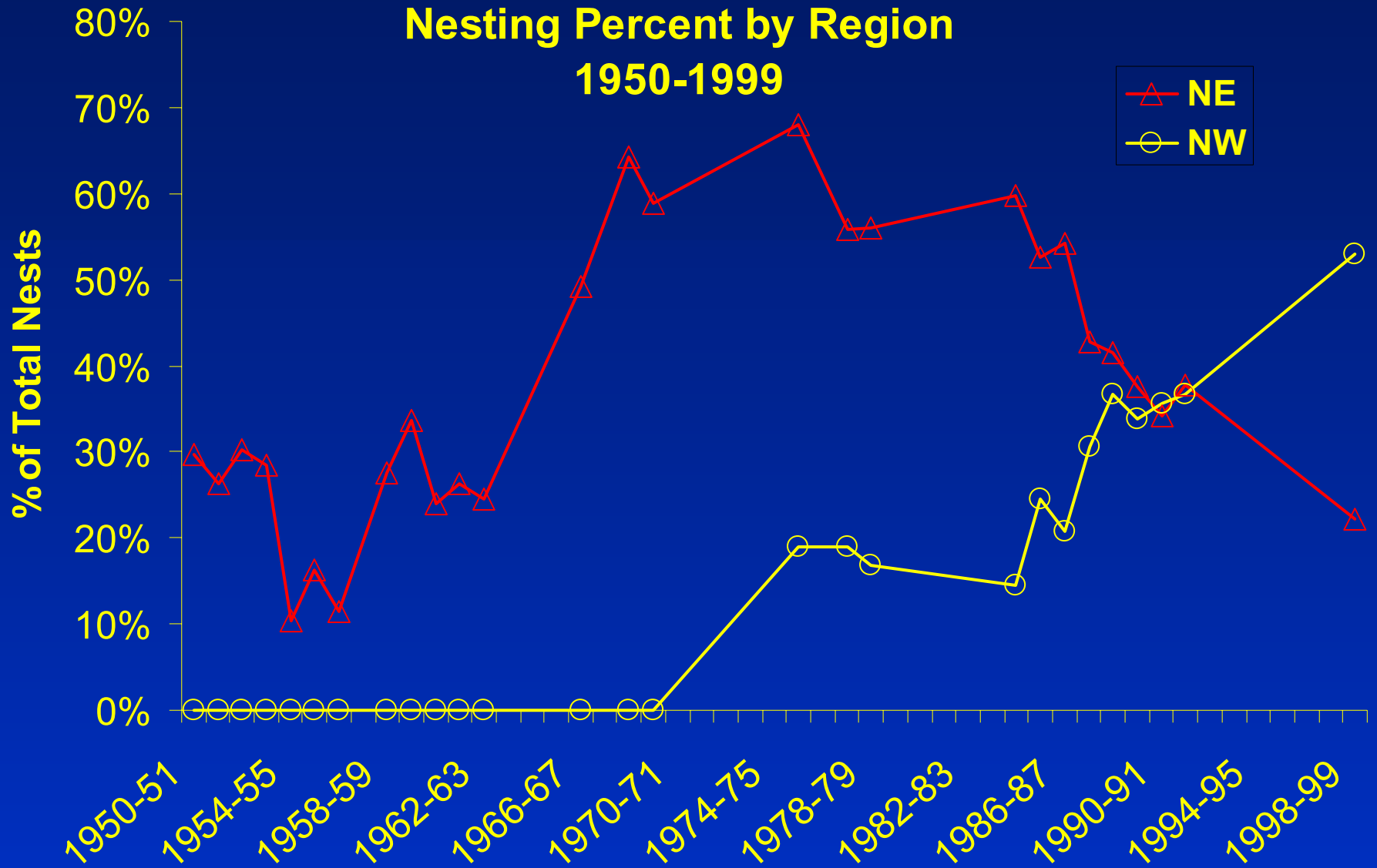


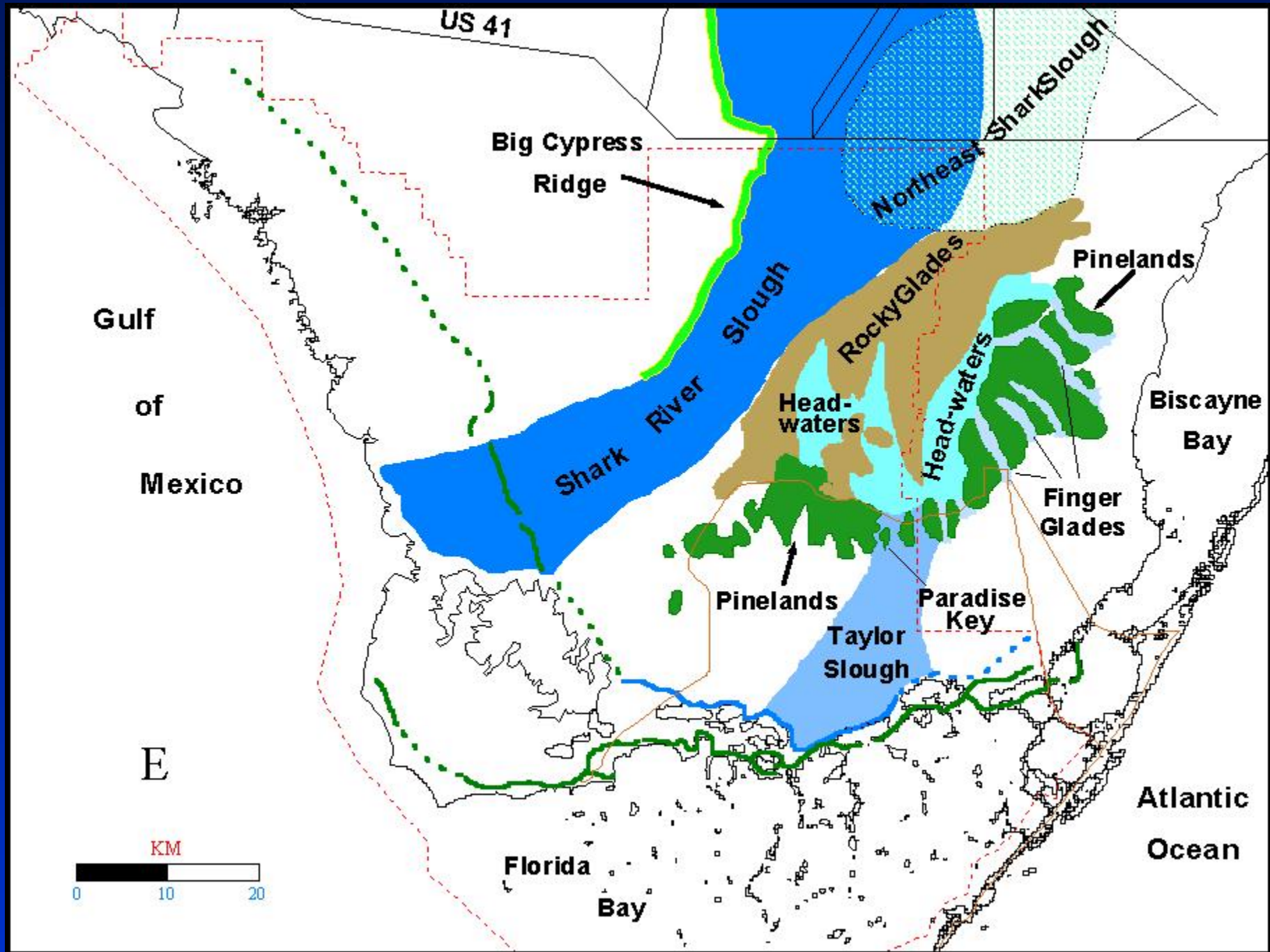
Spoonbills Abandoned the Southern Bay by 1972

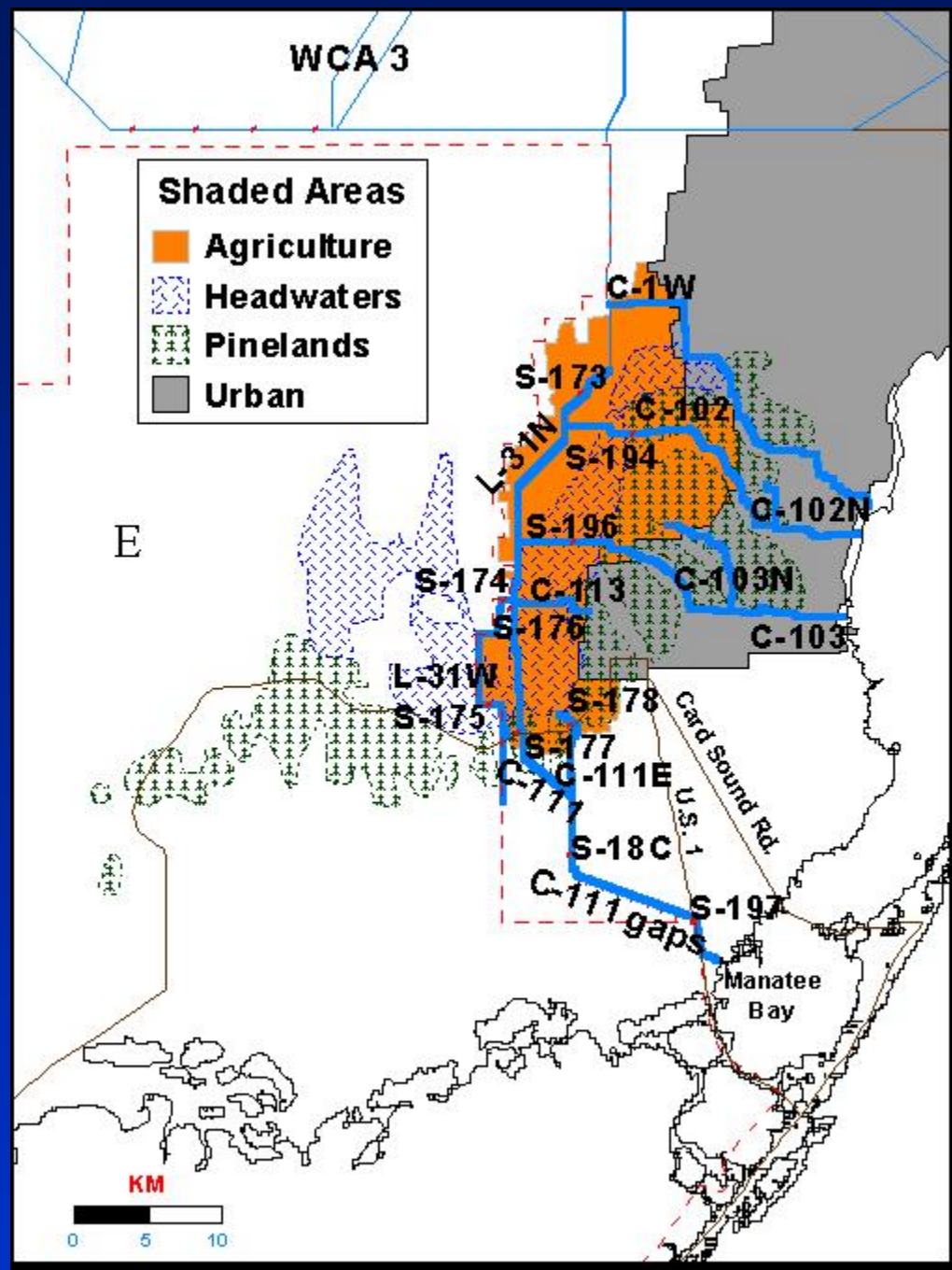
- Urban development of the Keys between 1959-1972 resulted in the loss of foraging grounds in the Keys
 - Spoonbills adjust nesting to food availability
- Resulted in
 - a shift in nesting effort to the northern Bay
 - a 10 fold decrease in nesting success



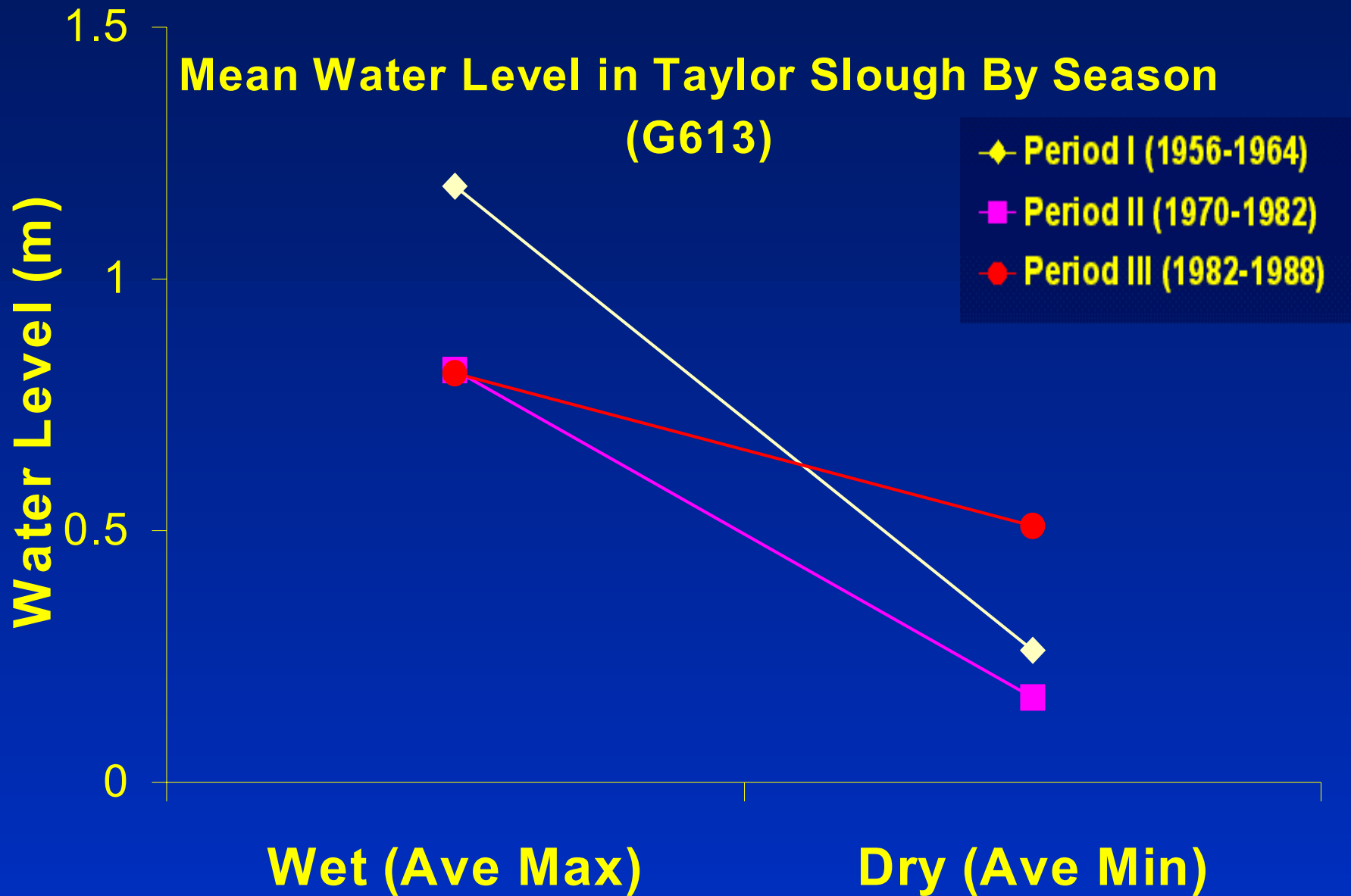
Nesting Percent by Region 1950-1999







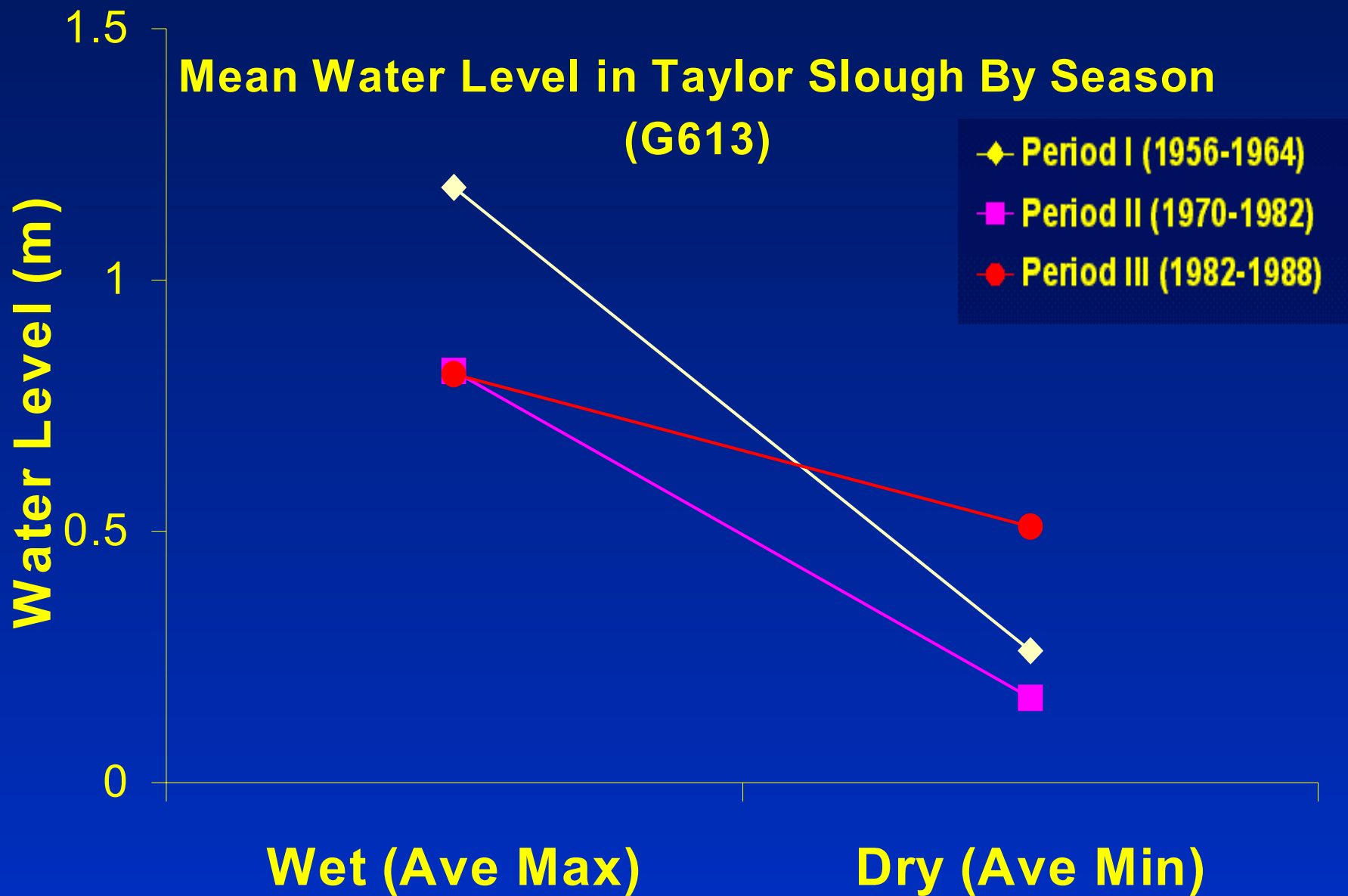






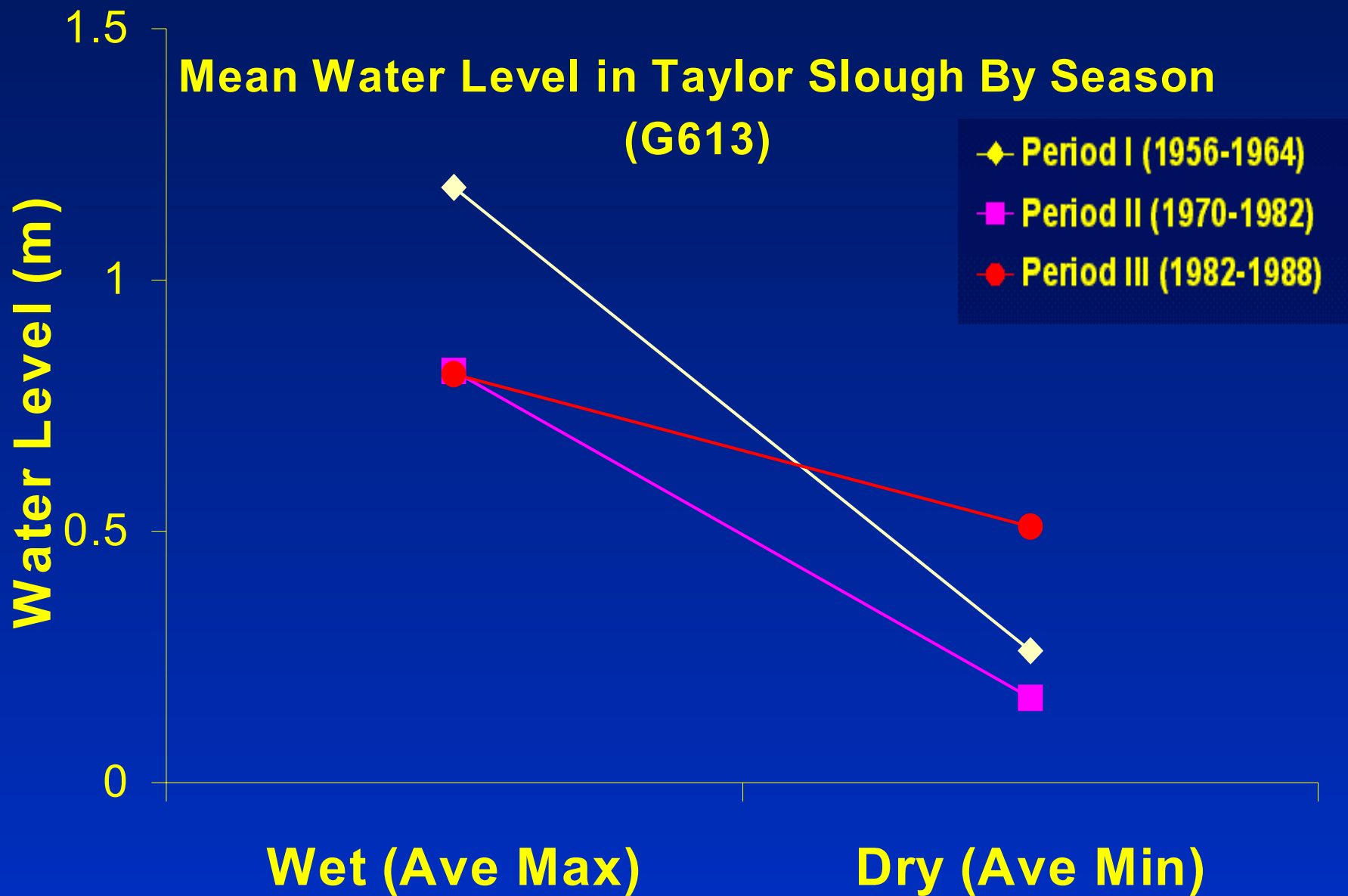
Period II Nest Success

| PERIOD II Year | Est. Chicks Per Nest | | % Deviation from Mean Rainfall | |
|-------------------|----------------------------|-----|--------------------------------------|-------|
| | NE | NW | Wet | Dry |
| 1964-65 | S | | -0.03 | -0.27 |
| 1965-66 | S | | 0.07 | 0.07 |
| 1966-67 | 1.8 | | 0.13 | -0.48 |
| 1967-68 | 1.4 | | 0.08 | -0.03 |
| 1968-69 | 2.2 | | 0.27 | 0.07 |
| 1969-70 | 2.0 | | 0.24 | 0.62 |
| 1971-72 | 2.0 | | 0.05 | 0.13 |
| 1973-74 | 1.6 | S | 0.02 | -0.34 |
| 1974-75 | 2.2 | S | 0.12 | -0.25 |
| 1975-76 | 0.8 | 0.5 | -0.02 | -0.07 |
| 1977-78 | 0 | F | -0.04 | 0.12 |
| 1978-79 | 0.6 | 0.5 | -0.05 | 0.27 |
| 1979-80 | 0.5 | | -0.05 | 0.15 |
| 1981-82 | S | S | -0.21 | -0.44 |
| Mean | 1.38 | | 0.04 | -0.03 |
| %Success | 71 | | | |



Period III Nest Success

| PERIOD III | Est. Chicks Per Nest | | % Deviation from Mean Rainfall | |
|-------------------|-------------------------|------|--------------------------------------|--------------|
| | NE | NW | Wet | Dry |
| Year | | | | |
| 1982-83 | 0.0 | S | 0.14 | 0.42 |
| 1983-84 | 0.5 | | 0.05 | 0.32 |
| 1986-87 | 0.0 | 0.0 | -0.02 | 0.14 |
| 1987-88 | 1.2 | 2.5 | -0.02 | -0.21 |
| 1988-89 | 1.9 | 1.9 | -0.16 | -0.29 |
| 1989-90 | 2.2 | 2.4 | -0.16 | -0.18 |
| 1990-91 | 1.8 | 2.1 | -0.10 | 0.40 |
| 1991-92 | 1.3 | 2.0 | -0.01 | -0.29 |
| 1992-93 | 0.0 | 0.0 | 0.16 | 0.22 |
| 1994-95 | 0.0 | 1.6 | 0.21 | 0.16 |
| 1995-96 | 0.1 | 0.1 | 0.33 | 0.08 |
| 1996-97 | 0.2 | 0.4 | -0.15 | 0.03 |
| 1997-98 | 0.0 | 0.4 | 0.00 | 0.48 |
| 1998-99 | 0.3 | 1.4 | 0.02 | -0.38 |
| Mean | 0.67 | 1.24 | 0.02 | 0.06 |
| %Success | 36 | 62 | | |

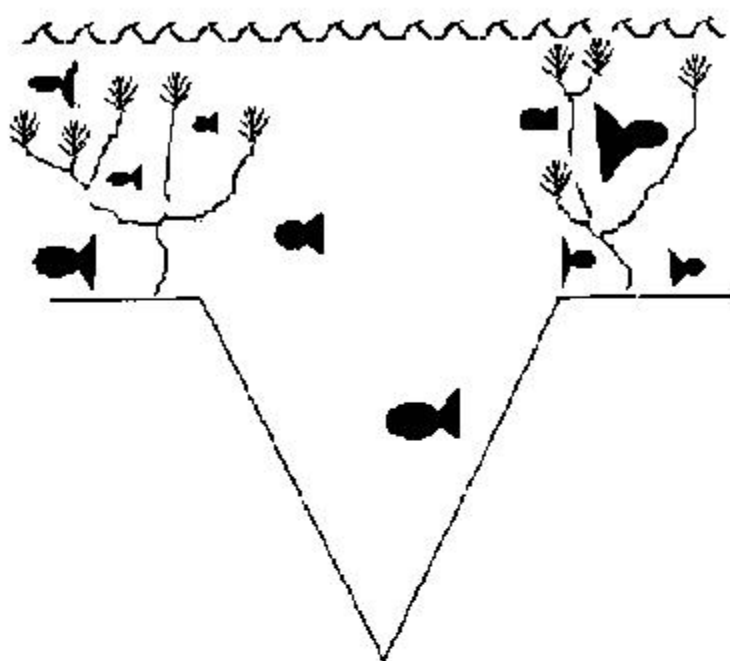


Spoonbills Responding to Food Availability

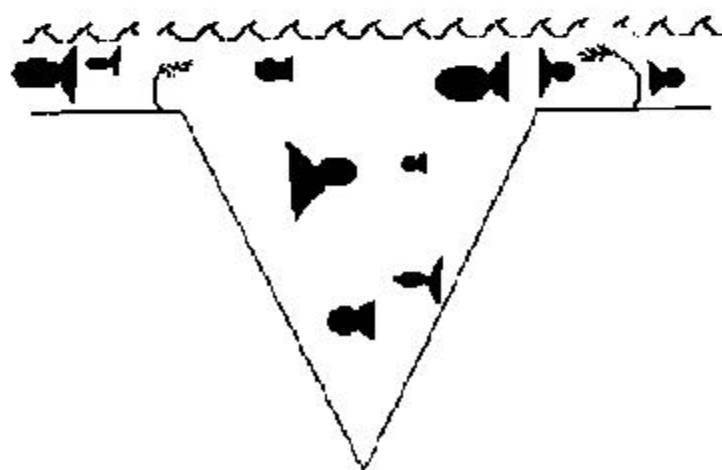
Water Management Impacts on Prey Fish

- Lower water levels reduced habitat for prey
- Shorter hydroperiod reduced productivity
- Higher salinity resulted in lower fish production

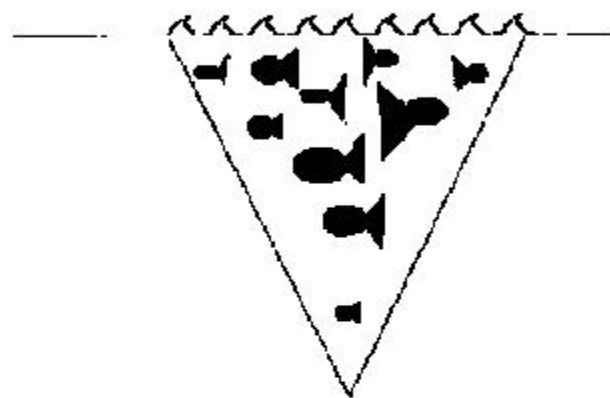
A. Wet Season



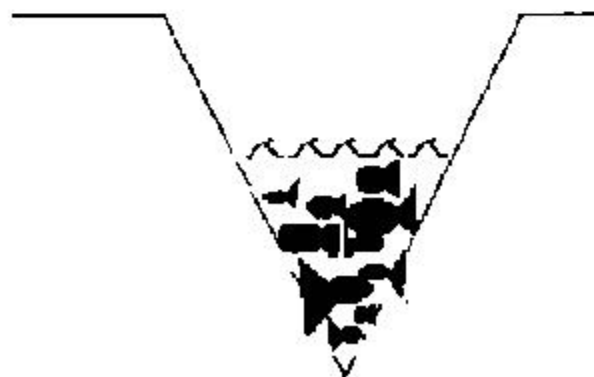
B. Early Dry Season

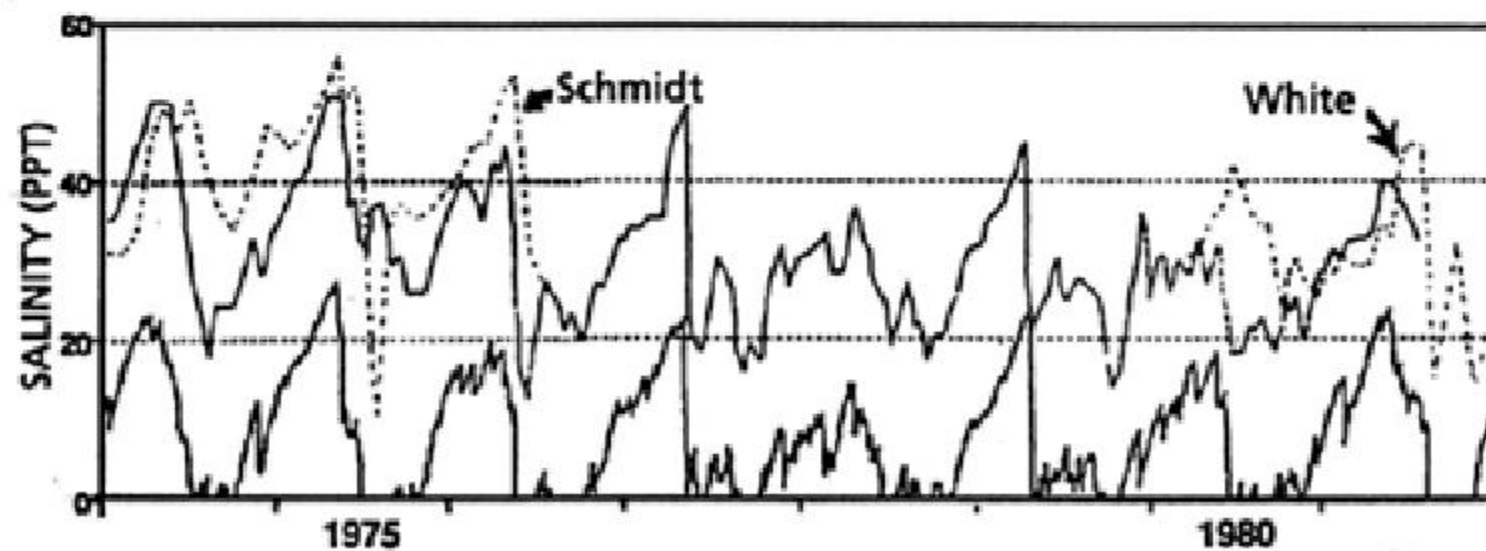
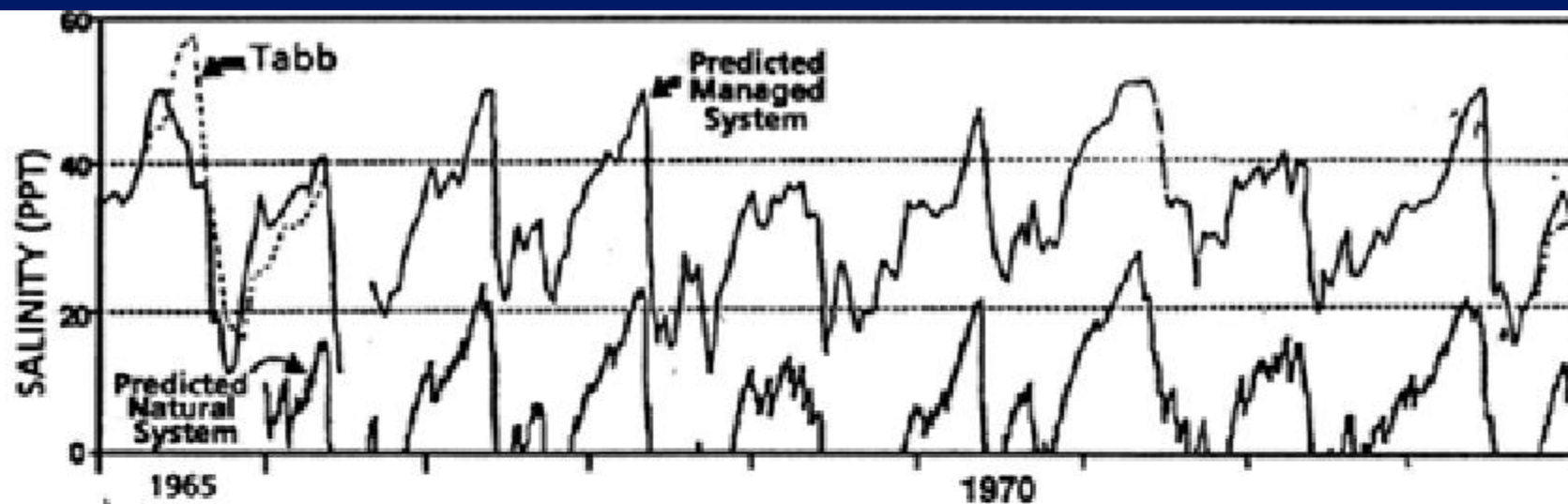


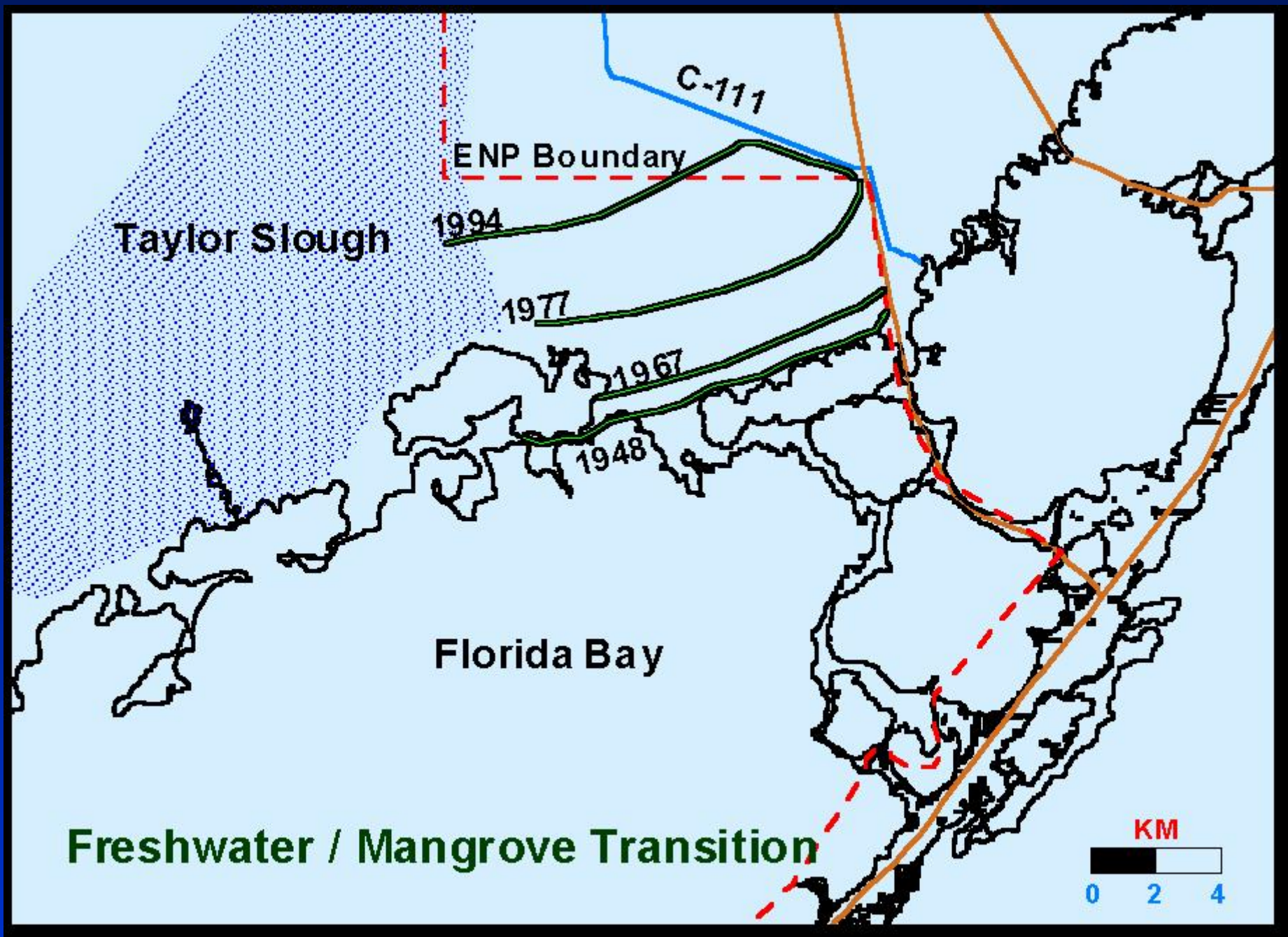
C. Mid Dry Season

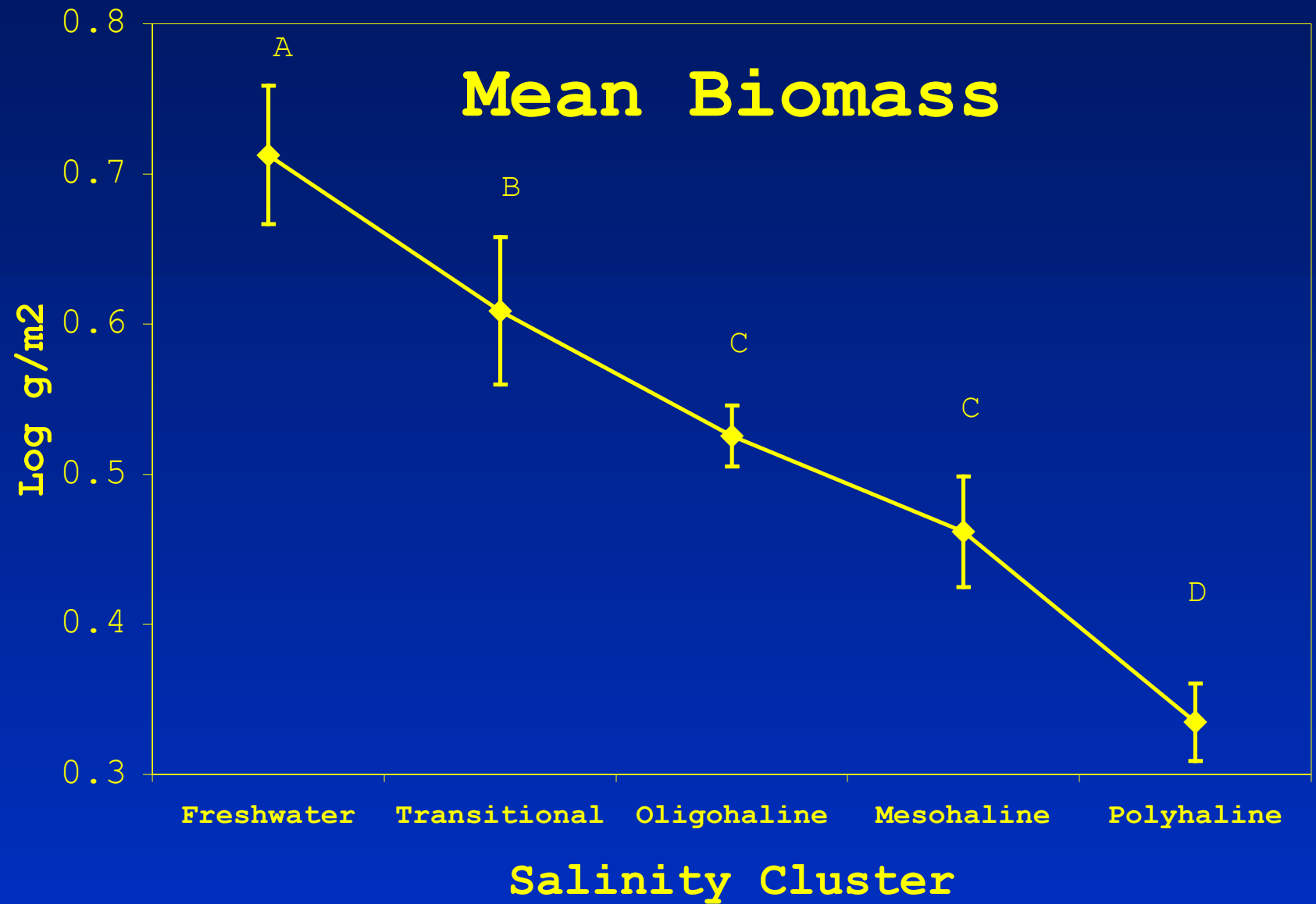


D. Late Dry Season









Evaluation of Recent Operations

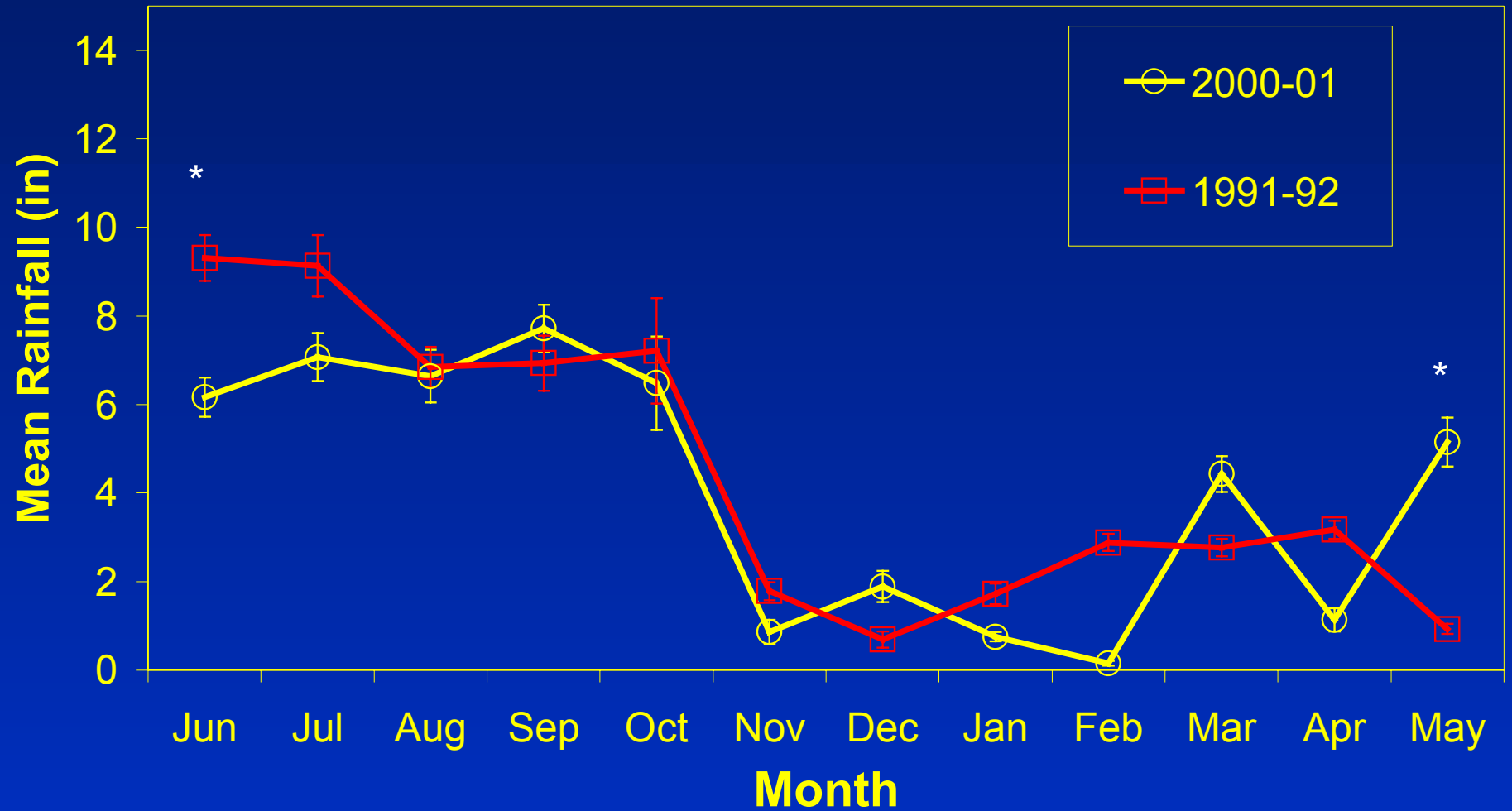
1991-92

- Below Average Rainfall
- Test 5 EPWD
- Height of Florida Bay Turmoil

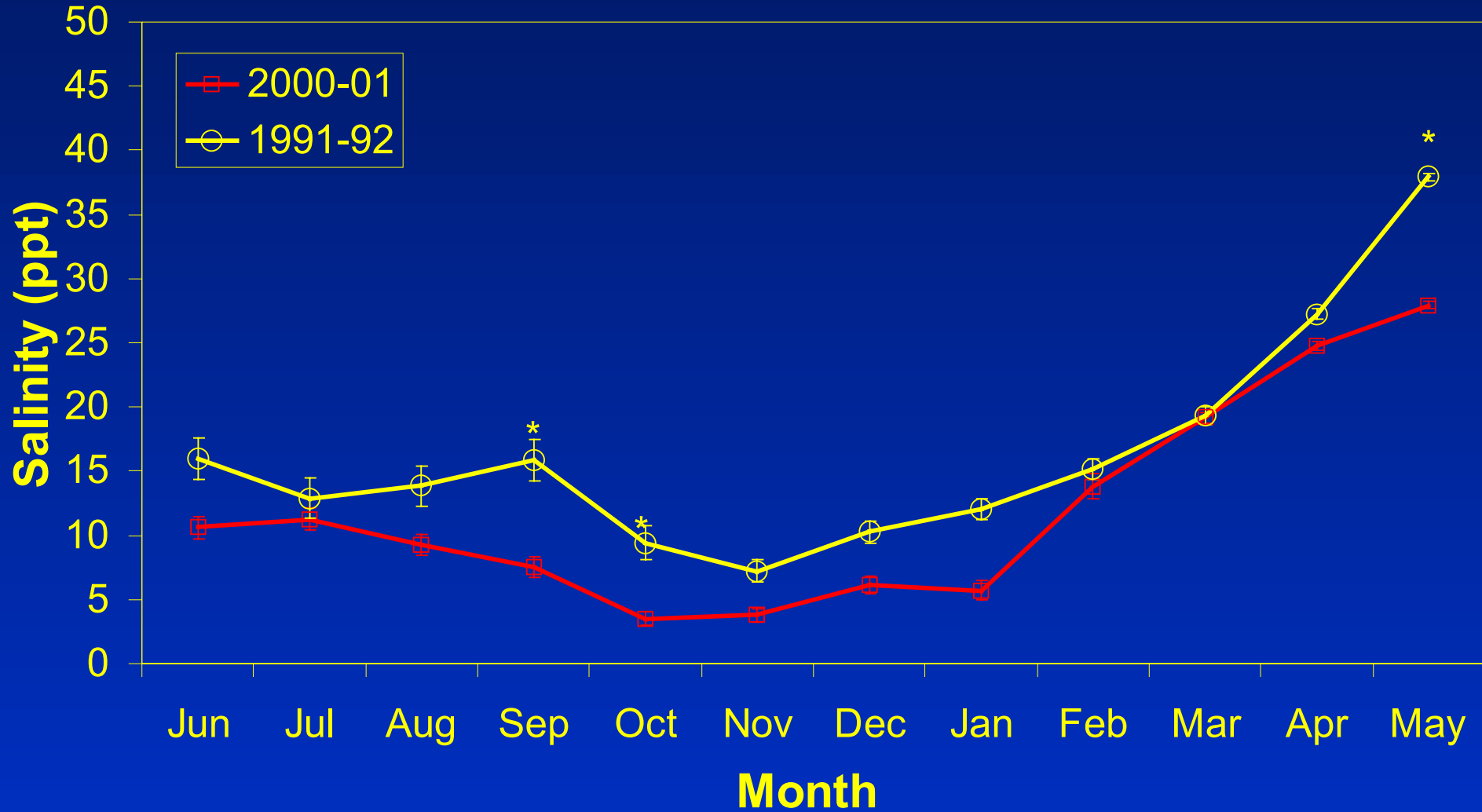
2000-01

- Below Average Rainfall
- ISOP 2001
- Most Recent Year

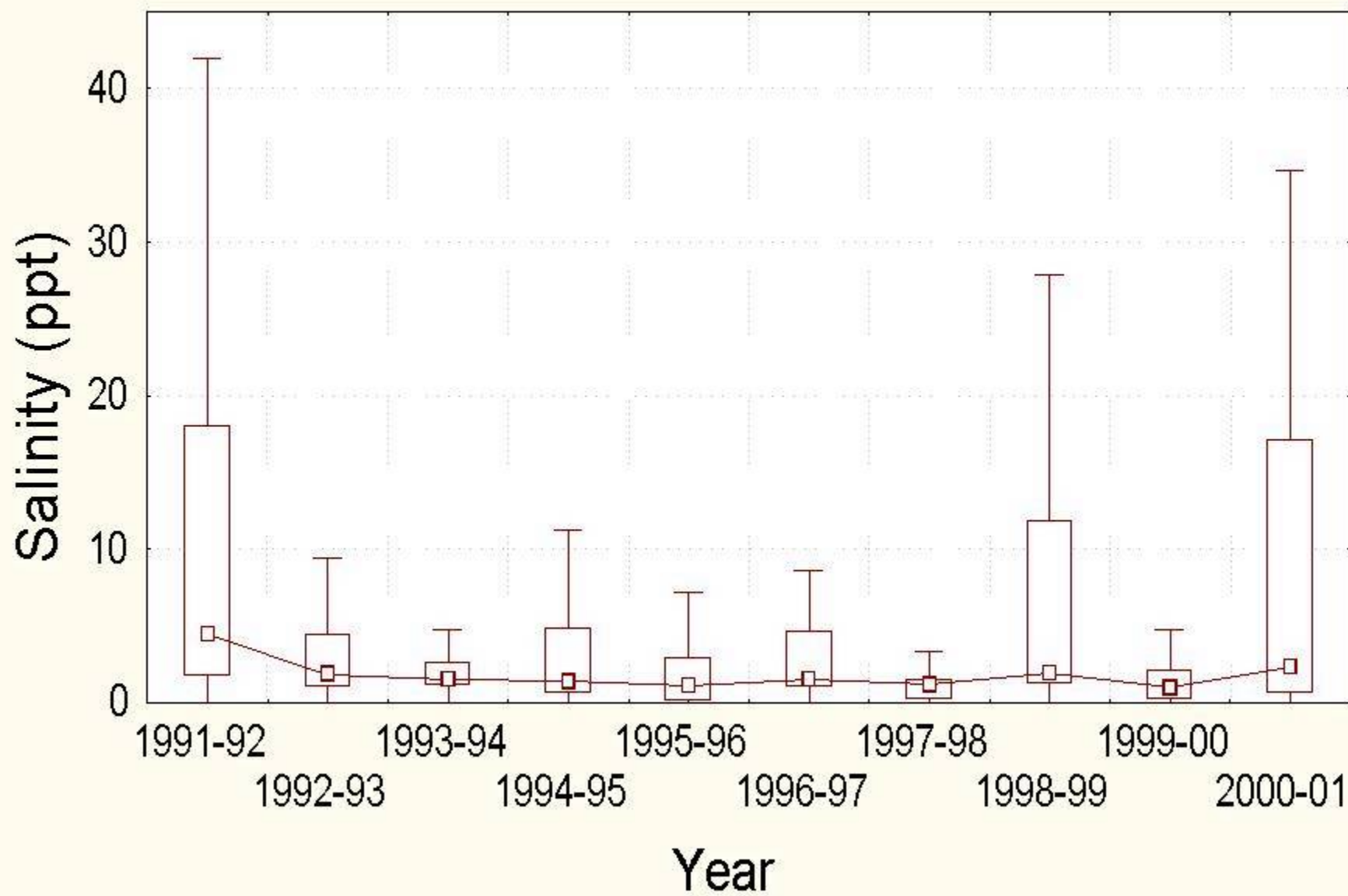
Rainfall Comparison



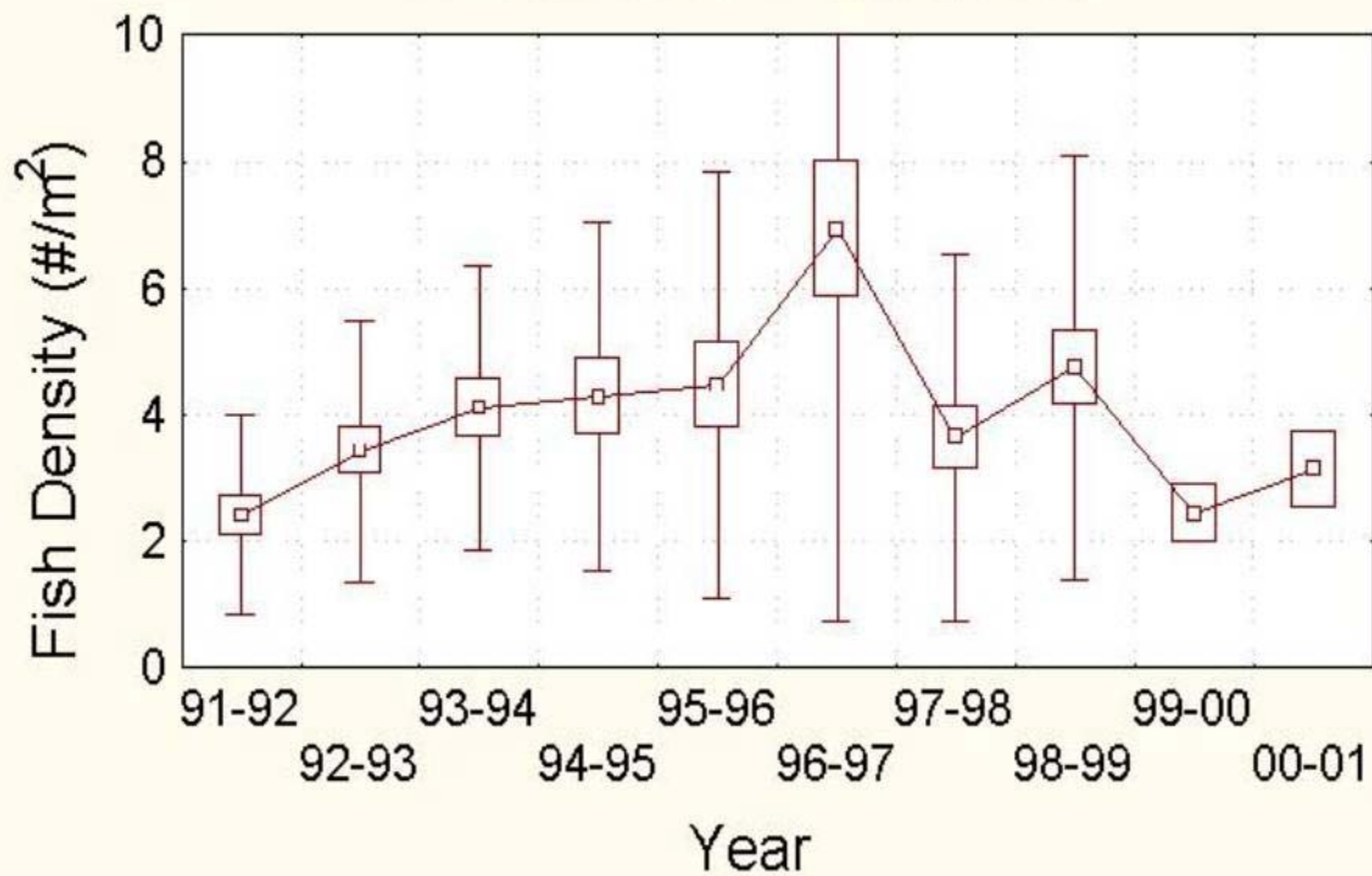
Salinity Comparison



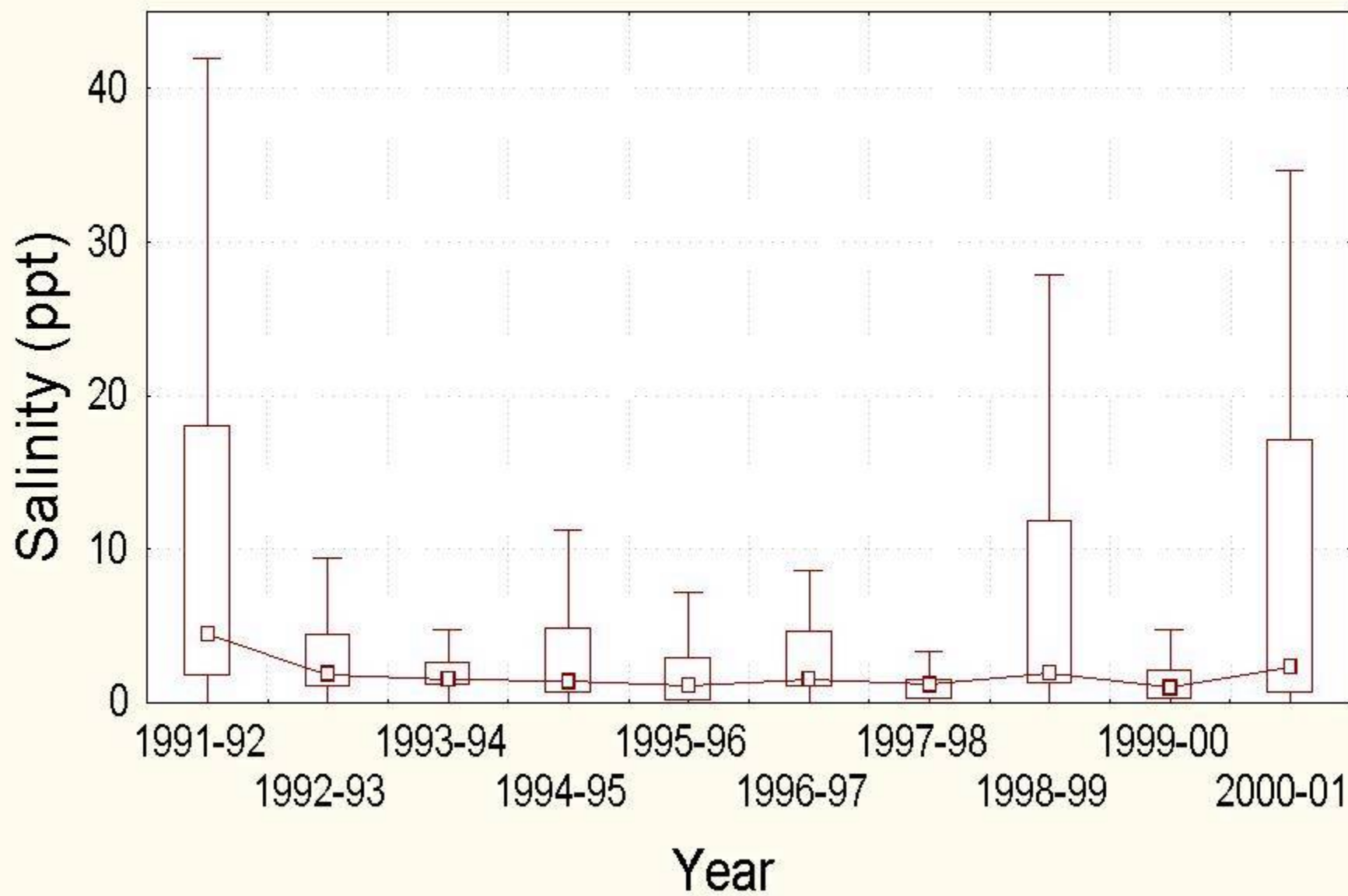
Annual Salinity Range 1991-2001



Annual Mean Fish Density



Annual Salinity Range 1991-2001



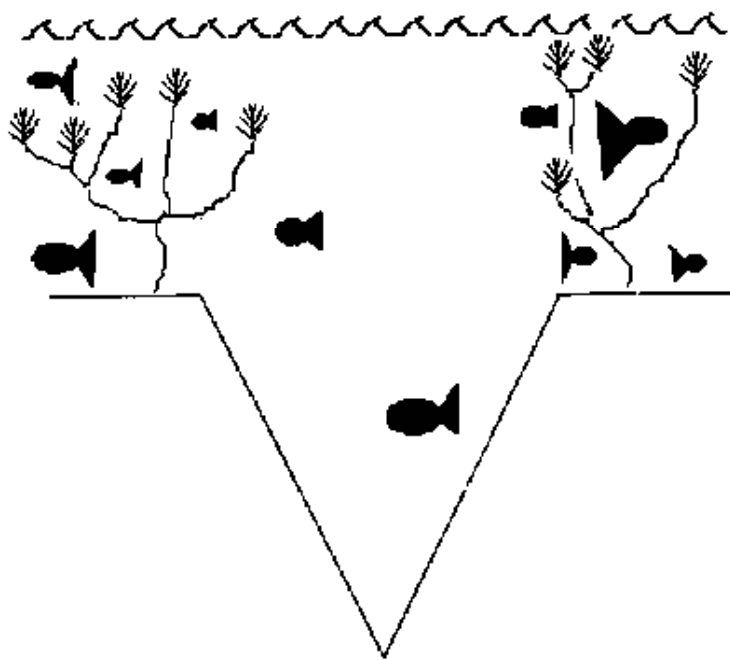


CAUTION:

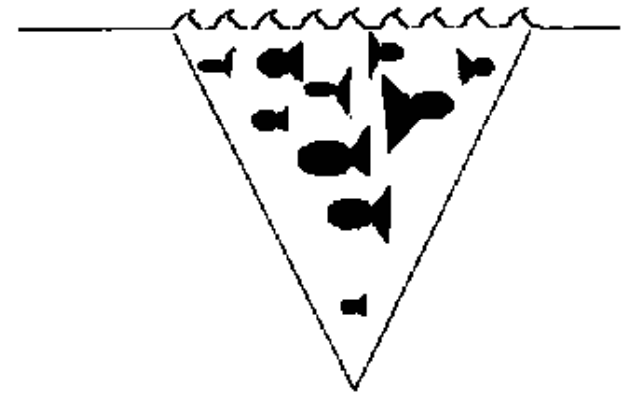
Timing is everything.

Can't justify the dumping of water
into the bay with the claim that it will
lower salinity

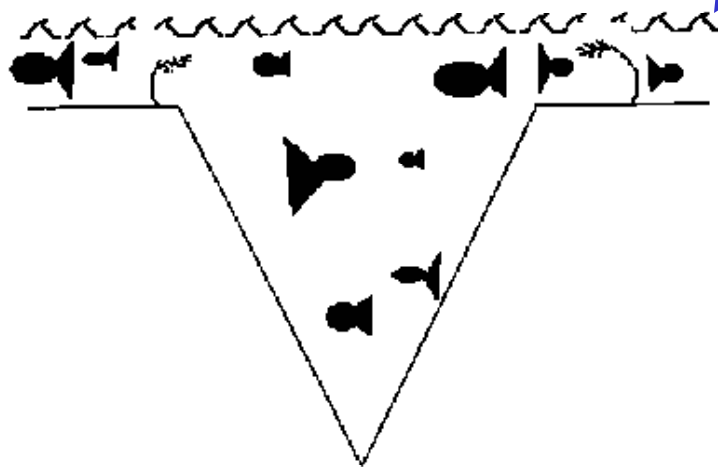
A. Wet Season



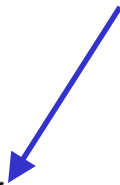
C. Mid Dry Season



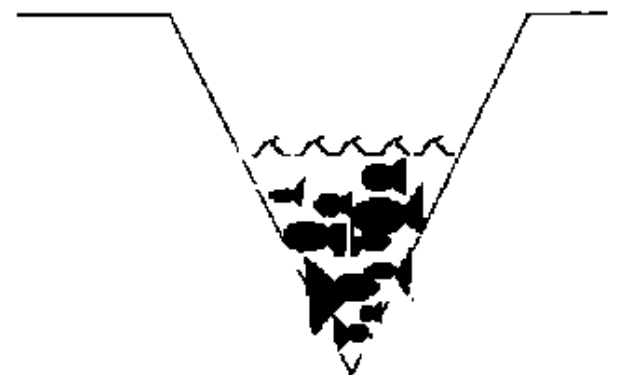
B. Early Dry Season



12.5 cm



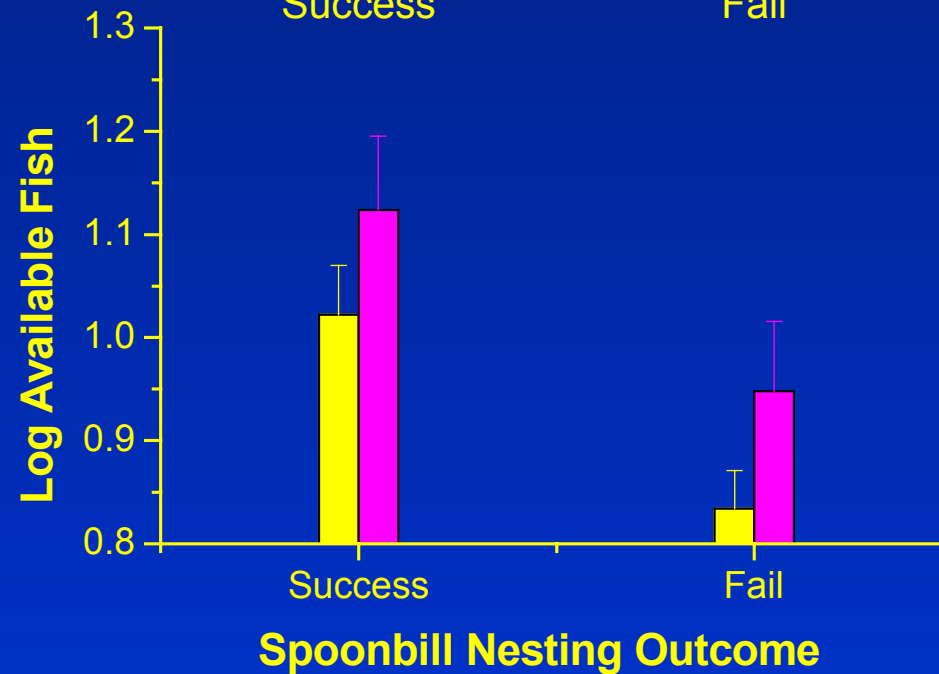
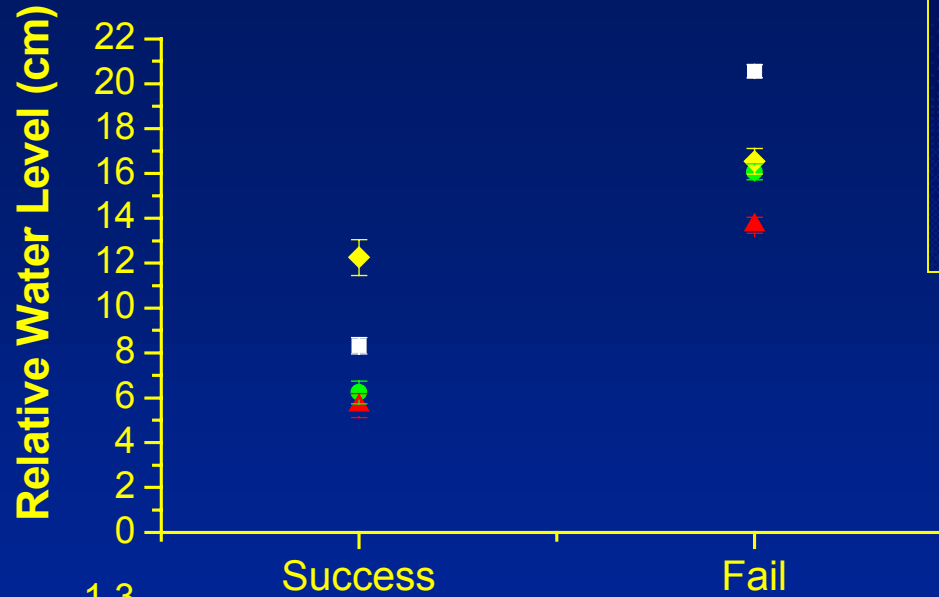
D. Late Dry Season

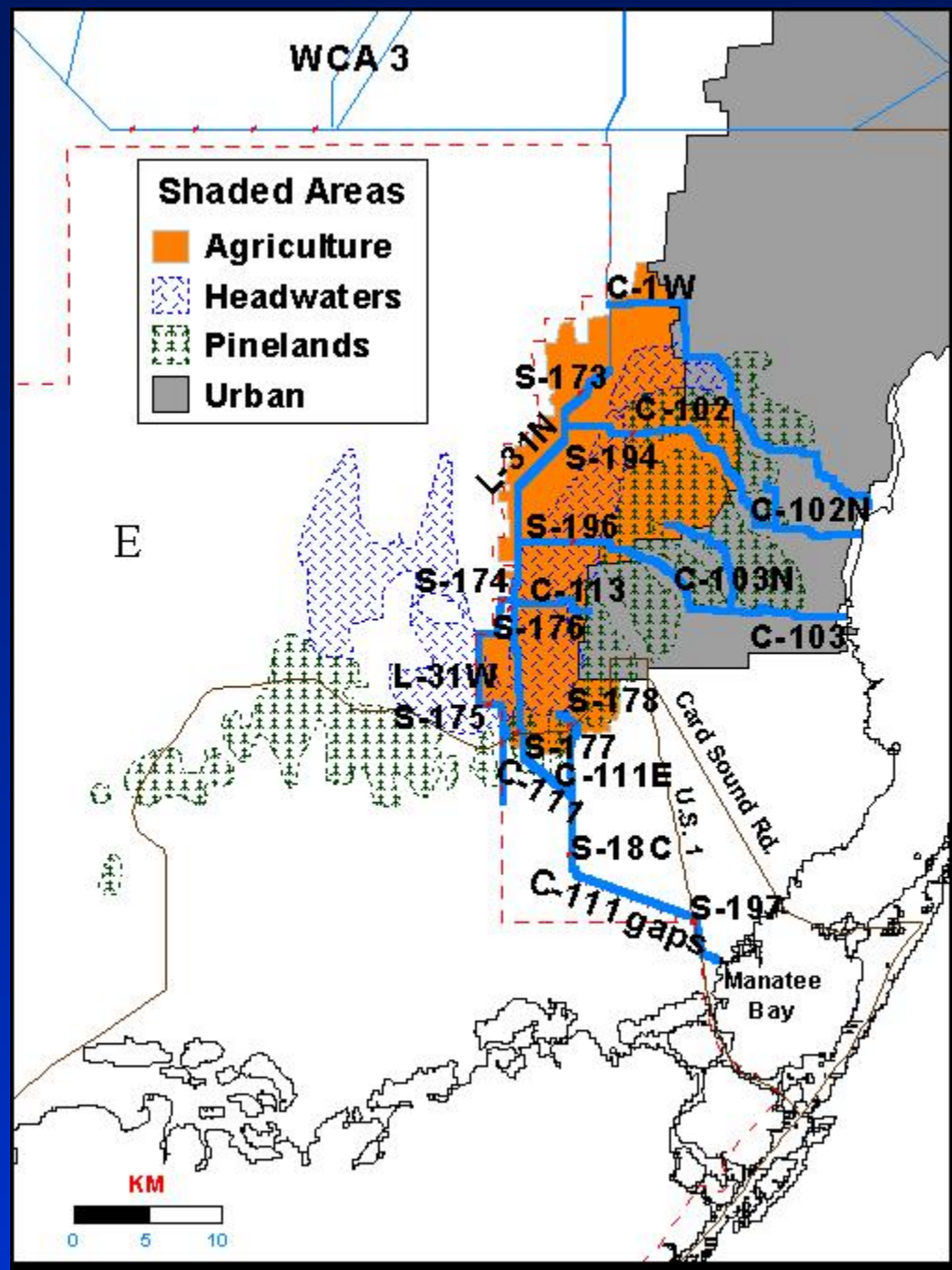


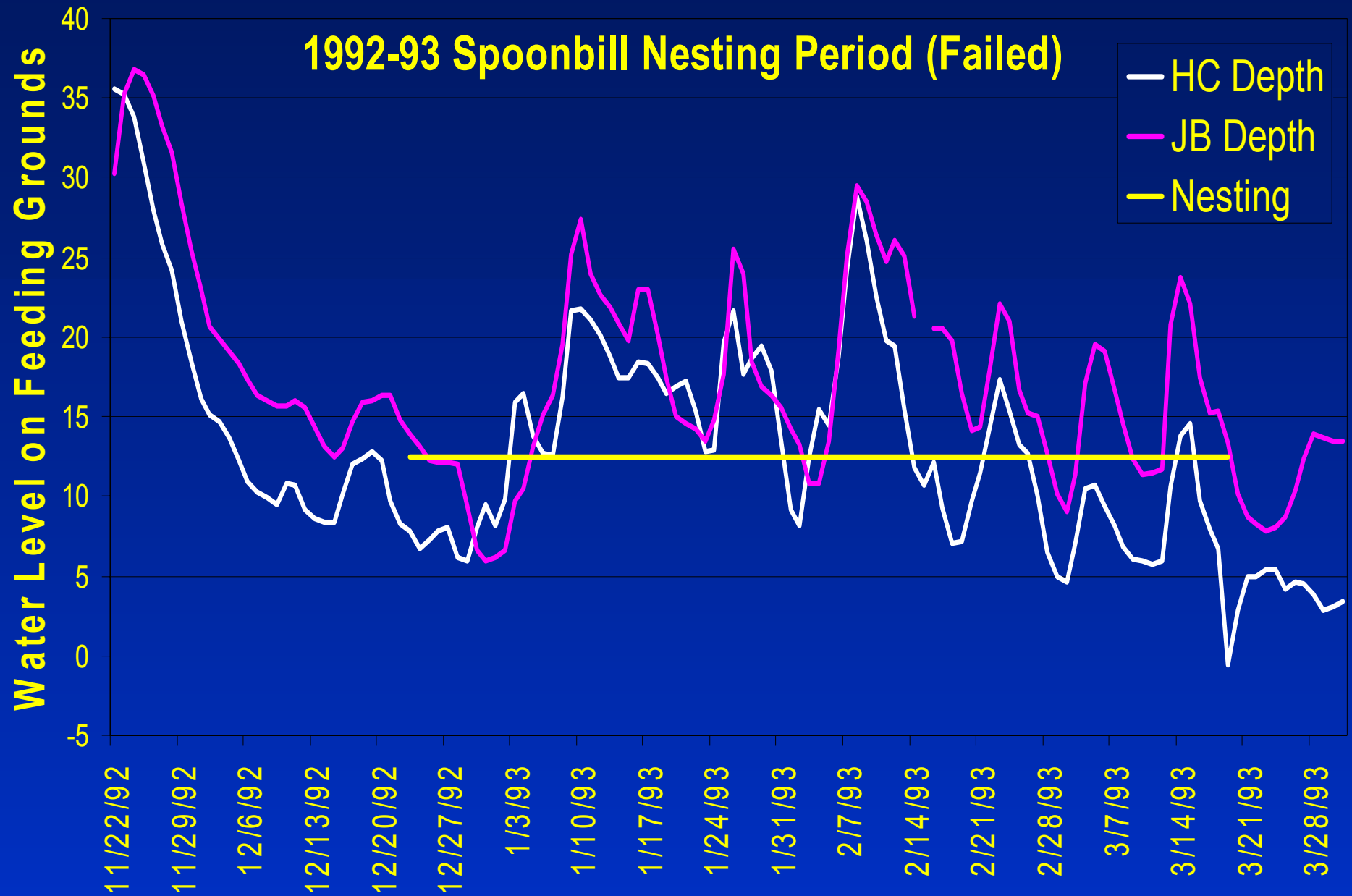




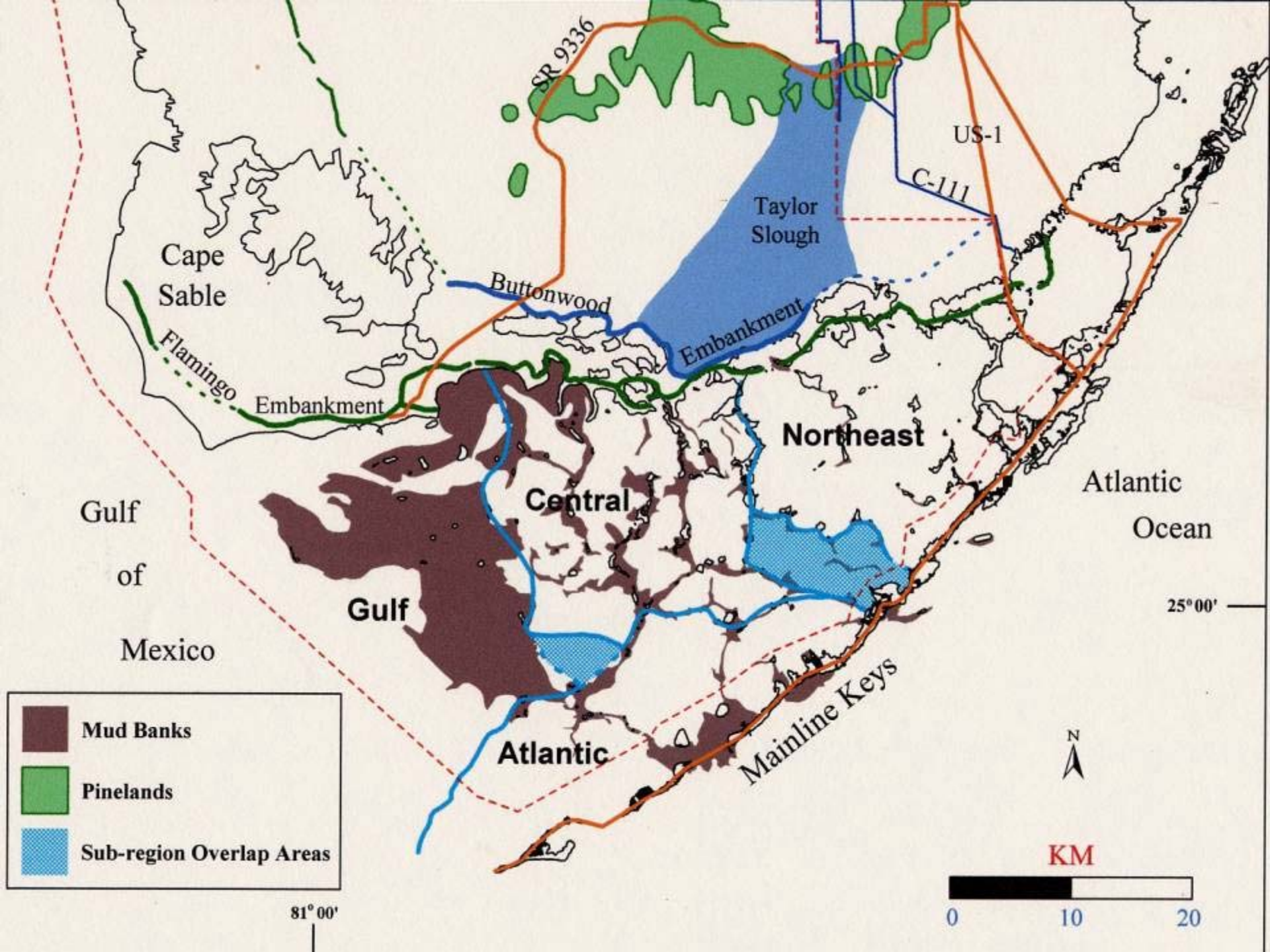
42 Days Post Hatching











Model: Seasonal Variation in Water Level

- Natural variation: hi water in wet season, low water in dry season
 - Best scenario for spoonbills
- Low wet, low dry = sustainable population?
- Low wet, hi dry = failure
- Reversals are lethal!